DMI

610
611 Series Computers
612

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NOW! A LOW-COST, PRACTICAL COMPUTER

THAT MAKES SENSE FOR YOUR REQUIREMENTS

At close to half the cost of digital computers with comparable capabilities, DMI's quality-built 610 Series are as practical as any sophisticated EDP equipment. Their solid-state reliability delivers exceptional performance. And they are built into a standard contemporary desk...need no special room or temperature control.

Programming is simple. Handsomely styled, DMI Computers include a human-engineered, comfortable console, input/output typewriter, paper tape punch/reader, and custom-designed chair as standard equipment. Or, for space-saving systems applications, use the DMI 612 optional rack-mount configuration.

Versatility? Comparison will show that no other computer is so uniquely designed for memory expansion on a modular basis. The DMI 611 and 612, for example, are pre-wired for up to 16 memory modules —each providing 256 additional words—so that you can increase memory capacity economically to suit your expanding requirements up to 4096 words.

Cost? The top of the line DMI 612, expanded to 1024 words of memory, is priced at less than $15,000. Compare DMI's computing value with any other computers available today.

BUSINESS REPLY CARD

NO POSTAGE STAMP NECESSARY IF MAILED IN UNITED STATES

POSTAGE WILL BE PAID BY:

DATA MACHINES, INC.
1590 MONROVIA AVENUE
NEWPORT BEACH, CALIFORNIA 92660

(DETACH CARD HERE)

Thank you...

... *for your recent inquiry*

The attached literature contains descriptive information and specifications covering the products about which you inquired.

Additional information or assistance regarding your particular application is yours for the asking.

Please fill out and return the business reply card, with no obligation.

DATA MACHINES, INC.

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1590 MONROVIA AVENUE, NEWPORT BEACH, CALIFORNIA 92660

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- ☐ Have a DMI sales engineer contact me
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NAME _____ TITLE _____

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CITY 01-5 _____ STATE _____ ZIP CODE _____
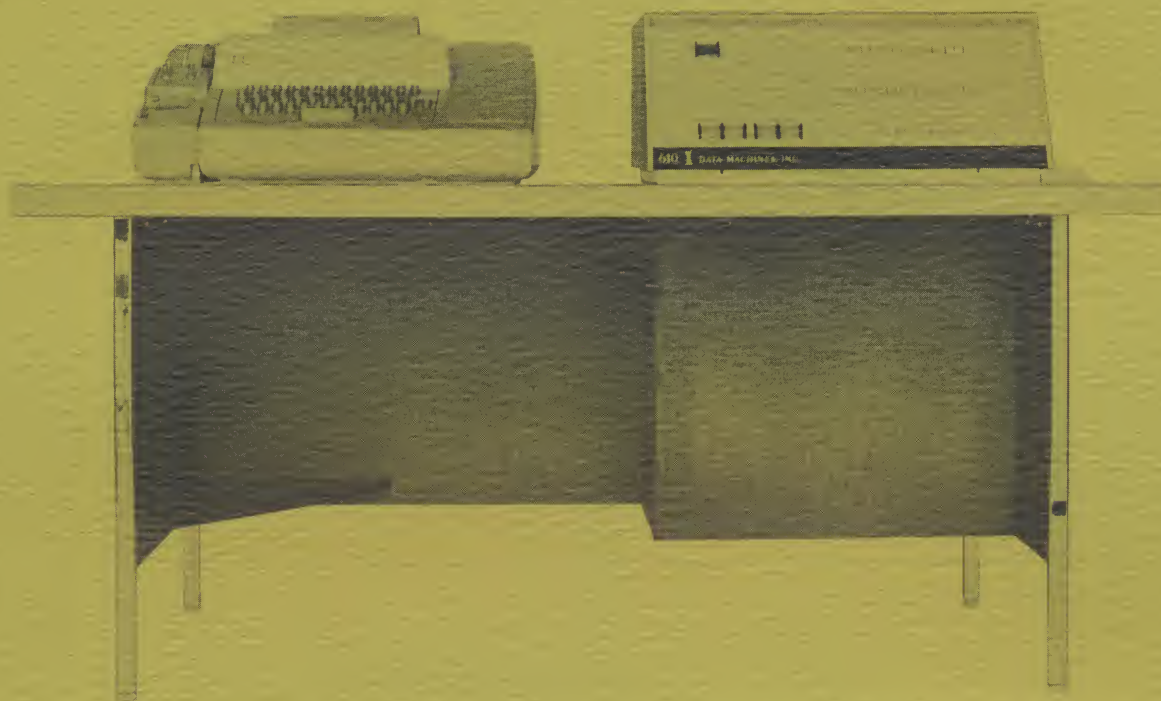
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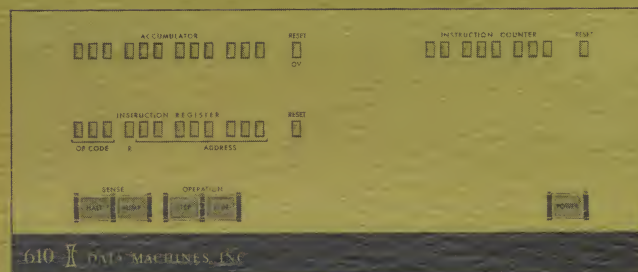
DMI 610 611 612 Series Computers

SUMMARY OF FEATURES

The DMI 610 Series encompasses a family of compatible computers which are designated DMI 610, DMI 611, and DMI 612. Each unit is backed by many years of Data Machines, Inc. experience in the field. Equally important, these quality machines incorporate DMI-built components that have outstanding records of proven reliability.

610 Series

WORD LENGTH	12-bits including sign
INSTRUCTIONS	28 different, plus micro-instruction features
SPEED (each instruction except input-output)	6msec including operand and instruction access
MEMORY	256 Words
INDEXING	
INDIRECT ADDRESSING	
SOFTWARE	Maintenance, Utility Programs
INPUT-OUTPUT	Model 33 Teletype
POWER	80 Watts

IDEAL FOR A WIDE RANGE OF APPLICATIONS

DMI 610—256 words of storage. Ideal for educational applications and those types of system control situations where minimum computations do not justify more memory.

DMI 611—Includes a hardwired index register and is pre-wired for up to 4,096 words of memory. Rapidly pays for itself in education, scientific problem solving and system control applications.

DMI 612—A faster, more powerful version of the 611. It is ideally suited for a wide range of applications including the following:

Scientific Problem Solving	Bio-Medical Research
Data System Programming	Paper/Magnetic Tape
Computer Satellite Units	Conversions
Process Control	Data Reductions, Scaling
T.V., Radio Program Switching	Automatic Checkout System
Communication Switching	Processor
Priority Distribution	Quality Control Analysis
Data Formating	Critical Path Scheduling
Numerical Control	Telemetry Formating
Programming	Electrical Distribution
Product Testing	Analysis
	Simulation Studies

EXCLUSIVE FEATURES

VersaLOGIC MODULES bring four years of extensive experience with proven reliable circuits to the small computer field.

4500 HOURS MTBF (in accordance with MIL-HDBK-217). A two-year life test program indicates 35,000 hours MTBF!

LOW POWER—Only 100 watts for basic computer, including display. This is less than half by comparison with comparable computers.

UNEXCELLED MEMORY FLEXIBILITY—Modules of 256 words are readily added to suit varying technical needs and budgetary allowances.

SPLIT MEMORY—A special memory organization technique which provides a significant breakthrough in minimum access programming.

INSTRUCTION REPERTOIRE comparable only to computers which cost two or three times more than the DMI 610 Series!

611 Series
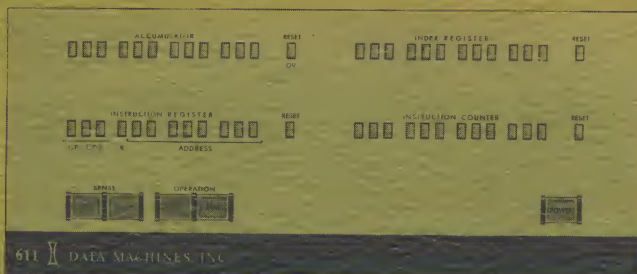
12-bits including sign

38 different, plus micro-instruction features

6msec including operand and instruction access
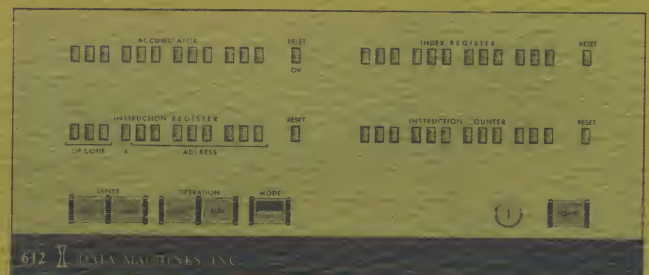
256 Words expandable to 4096

Hardwired Index Register

Maintenance, Utility, Double-Precision Arithmetic Programs, Symbolic Assembler

Model 33 Teletype. Other devices optionally available

100 Watts, plus 1½ Watts for each additional 256 words of memory

612 Series

12-bits including sign

50 different, plus micro-instruction features

200usec minimum operand and instruction access (typical 500usec)
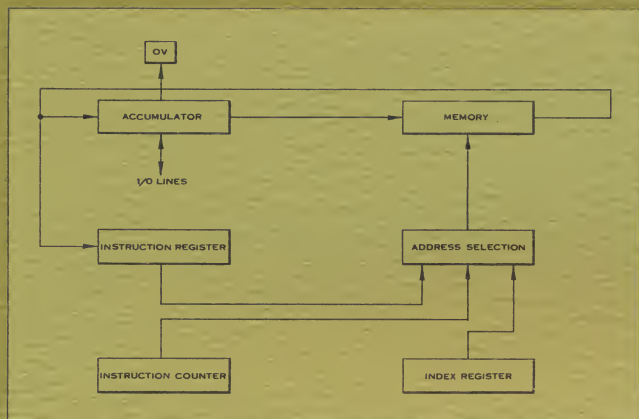
256 Words expandable to 4096

Hardwired Index Register

Hardware: under program control

Maintenance, Utility, Elementary functions, Symbolic Assembler, FORTRAN

Model 33 Teletype. Other devices optionally available

100 Watts, plus 1½ Watts for each additional 256 words of memory

DMI 610 611 Series Computers 612

An alternate action switch provides power to the computer. A safety lock is included in the 612 model. This key-operated lock disconnects all console functions from the internal machine. Rack mount option is illustrated below.

INTERNAL ORGANIZATION

The internal processor has six basic sections. These consist of four 12-bit registers, a serial memory, and an address selector. Serial techniques are employed extensively to provide the maximum in efficiency and economy.

ACCUMULATOR (AC)—Performs all arithmetic, logical, and shift operations. Execution is synchronized with serial bit train from memory. Holds results following execution of an instruction. Provides control of OV (Overflow) indicator.

INSTRUCTION REGISTER (IR)—Receives 12-bit instruction from memory during "Instruction Fetch" cycle. Holds instruction during "Execution" cycle.

INSTRUCTION COUNTER (IC)—Holds address of next instruction during "Instruction Fetch" cycle. Automatically incremented by one prior to "Execution" cycle. Receives word from Instruction Register to implement program transfer.

MEMORY (M)—Used for storage of data and instruction words. Employs high reliability magnetostrictive delay lines for memory element. Each module provides 256 words of storage. DMI Models 611 and 612 are prewired for 16 modules allowing immediate plug-in expansion up to 4096 words.

INDEX REGISTER (XR)—Used for augmenting the operand address or as an incremental counter. Greatly expands the addressing capability of the computer. Standard equipment on 611 and 612.

ADDRESS SELECTOR—Selects operand address from Instruction Register or Instruction Address from Instruction Counter. Provides computation for relative addressing.

CONSOLE

The console has been carefully engineered for maximum flexibility and ease of operation. All registers are displayed and incorporate individual switch-lights which allow complete manual operation. Control and Mode select switches are simple and direct.

REGISTER DISPLAY—The contents of all four registers are displayed by means of rectangular lights. These lights are also momentary action switches. Whenever a light is pressed, the corresponding bit is set to a "one" and the light is turned on. A separate reset button is provided for each register.

SENSE SWITCHES—Two alternate action sense switches are provided—a "Halt on Sense" switch which implements the conditional halt instruction, and a "Jump on Sense" switch which implements the conditional transfer instruction.

OPERATION CONTROL SWITCHES—A Step and Run switch are provided for operation control. These are momentary action push buttons. The Step button causes the computer to execute the current instruction and advance to the next instruction. The Run button initiates continuous program execution.

ADDRESS MODE SWITCH—The Address Mode Switch (612 only) is used for selection of the "Relative" or "Indirect" addressing mode. The switch is momentary action and contains a split level indicator. The switch is effective only when the computer is in the "Step" mode. When in "Run" the address mode is under program control.

DMI 610 SERIES INSTRUCTIONS

GENERAL

The DMI 610 Series instructions are "upwards" compatible and offer a wide variety of operations, including: load, store, arithmetic, logical, shift, register change, control, input-output, indexing, indirect addressing, relative addressing, and immediate addressing.

Memory cycle time in the DMI 610 Series is 3ms. A single operation requires a "fetch cycle" and an "execution cycle" of 3ms each. In the 612 the memory is structured to provide minimum access capability. Fetch and execution cycles are minimized to 100 usec.

OUTSTANDING FEATURES

Exceptional programming capability has been provided through many outstanding features. Several of these features are listed below:

Features Common to the 610, 611 and 612

OVERFLOW INDICATOR—permits rapid execution of multiply, divide and double precision add or subtract.

LOGICAL OPERATIONS—all logical operations (And, Or, Exclusive Or) are provided to give optimum capability in data formatting and symbol manipulation.

MICRO-INSTRUCTIONS—three sets of micro-instructions are provided; Register Change, Jump and Execute Immediate. Any combination within a set can be executed simultaneously by ORing the instruction codes.

Features included in the 612

JUMP AND MARK—performs the jump operation and simultaneously stores the instruction counter, incremented by two, in the index register.

ADDRESS MODE—provides selection of either Relative or Indirect Addressing for the addressable class of instructions. Selection is continuous until changed by a new instruction.

SPLIT MEMORY—each 256 word memory module is split into an upper and lower half. These two halves are then overlapped. This provides automatic interlacing of instructions and data, allows separate grouping of instructions and data, and greatly simplifies minimum access programming.

CLASSIFICATION

The DMI 610 Series executes three classes of instructions: Class I Addressable, Class II Non-Addressable, and Class III Double-Word. The addressable instructions reference memory to deposit or retrieve data. The non-addressable instructions do not reference memory and use the address portion to extend the instruction repertoire. The two-word instructions are used to control program flow and provide "immediate" addressing.
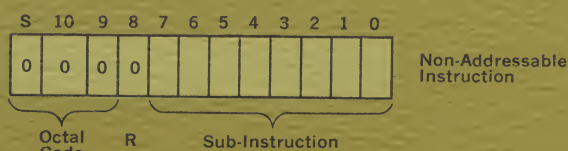
WORD STRUCTURE

CLASS I The structure of Class I instructions is illustrated below:
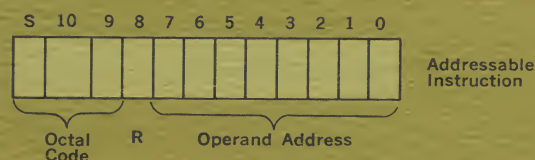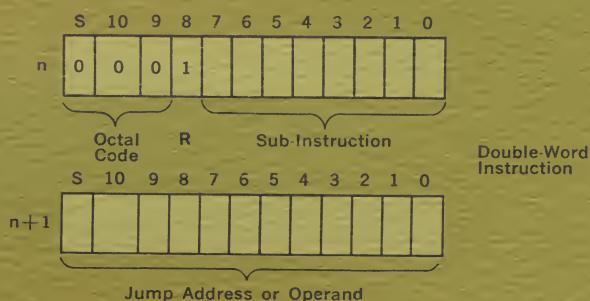
The first three bits (S to 9) contain the octal number of the instruction to be executed. Bits 7 through 0 provide the operand address and can be used to directly address the first 256 words of memory. Bit 8, when it is a "one," commands the computer to address relative or indirect, depending on the address mode. In the Relative Mode the contents of the Index Register is added to the operand address for the effective address of the operand. In the Indirect Mode the operand address specifies one of the first 256 words of memory where the effective operand address is to be found.

CLASS II The structure of Class II instructions is illustrated below:

The first three bits (S to 9) contain the octal code "zero" and bit 8 also contains "zero," this designates all non-addressable instruction. Bits 7 through 0 contain the sub-instruction.

CLASS III The structure of Class III instruction is illustrated below:

The Class III instruction is double word instruction (24-bits). The first three bits (S to 9) of word one contain the octal code "zero" and bit 8 contains "one," this designates all double-word instructions. Bits 7 through 0 contain the sub-instruction. The second word contains the jump address or operand. The second word must be located immediately adjacent (n+1) to the first word (n).

DATA WORD

The structure of typical data words is illustrated below:
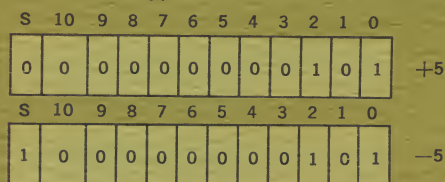
Data is represented in sign and magnitude notation and all arithmetic operations are carried out in serial, modulo 2^{11}.

DMI 610 611 Series Computers 612
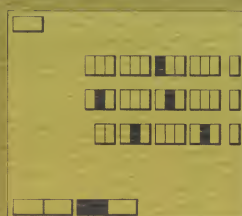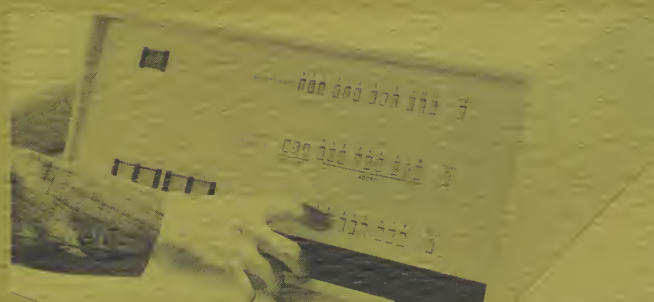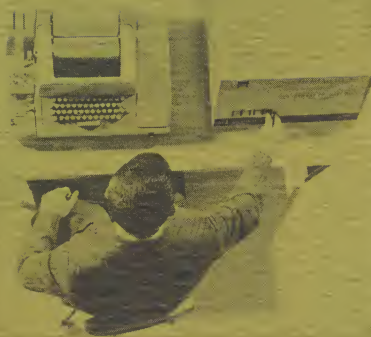
INSTRUCTION LIST

DMI 610 Series instruction have been designed to offer the best compromise between flexibility, computing power and memory size for the cost. The following table describes the individual instruction:

INSTRUCTION LIST — CLASS I

Type	Mnemonic	Octal	Cycle Time [1]	Description
LOAD/STORE	LDA	2	1	Load AC Register
	STA	3	1	Store AC Register
ARITHMETIC	ADD	4	1	Add to AC Register
	SUB	5	1	Subtract from AC Register
LOGICAL	XOR	6	1	Exclusive Or to AC Register
	LPR	1	1	And to AC Register
	LSM	7	1	Or to AC Register

INSTRUCTION LIST — CLASS II

Type	Mnemonic	Octal	Cycle Time [1]	Description
INPUT/OUTPUT	RHO	300	24 char/sec	Read tape Octal High Speed
	RTO	302	10 char/sec	Read tape Octal & Copy
	RKO	304	variable	Read Keyboard Octal & Copy
	RHA	301	24 char/sec	Read tape alphanumeric High speed
	RTA	303	10 char/sec	Read tape alphanumeric & Copy
	RKA	305	variable	Read keyboard alphanumeric & Copy
	WTO	306	10 char/sec	Write contents of accumulator octal
	WTA	307	10 char/sec	Write contents of accumulator alphanumeric
HALT	HLT	000	1	Unconditional Stop
	HTS	040	1	Halt if Halt Switch Set
SHIFT	RL1	101	1	Rotate AC left 1 position $(AC_8 \rightarrow AC_0)$
	RL2	102	1	Rotate AC left 2 position $(AC_8 \rightarrow AC_0)$
	RL3	103	1	Rotate AC left 3 position $(AC_8 \rightarrow AC_0)$
	SR1	111	1	Shift AC right 1 position $(AC_0 \rightarrow Overflow\ F/F)$
	SR2	112	1	Shift AC right 2 position $(AC_0 \rightarrow Overflow\ F/F)$
	SR3	113	1	Shift AC right 3 position $(AC_0 \rightarrow Overflow\ F/F)$
REGISTER CHANGE	TAI[3]	201	1	Transfer (AC) $\rightarrow$ IC
	TAX[2]	202	1	Transfer (AC) $\rightarrow$ XR
	TIA[3]	204	1	Transfer (IC) $\rightarrow$ AC
	TXA[2]	210	1	Transfer (XR) $\rightarrow$ AC
	TXI[2]	220	1	Transfer (XR) $\rightarrow$ IC
	INX[2]	240	1	Increase XR by 1
NO OPERATION	NOP	100	1	No Operation is performed
MODE CONTROL	SMR[3]	241	1	Set Mode to Relative
	SMI[3]	242	1	Set Mode to Indirect

INSTRUCTION LIST — CLASS III

Type	Mnemonic	Octal	Cycle Time [1]		Description
			610 & 611	612	
JUMP	JMP	401	1	2	Jump **unconditionally**
	JMN	402	1	2	Jump if AC **negative**
	JMZ[2]	404	1	2	Jump if AC **zero**
	JMO	410	1	2	Jump if Overflow **Set**
	JMS	420	1	2	Jump is Sense Switch **Set**
	JMR[3]	440		2	Jump if **Relative Mode**
JUMP & MARK	JKP[2]	501	1	2	Jump **unconditionally** and mark
	JKN[2]	502	1	2	Jump if AC **negative** and mark
	JKZ[2]	504	1	2	Jump if AC **zero** and mark
	JKO[2]	510	1	2	Jump if Overflow **Set** and mark
	JKS[2]	520	1	2	Jump if Sense Switch **Set** and mark
	JKR[3]	540	1	2	Jump if **Relative Mode** and mark
EXECUTE IMMEDIATE	LAI[3]	601		2	Load AC immediate
	SAI[3]	602		2	Store AC immediate
	LXI[3]	604		2	Load XR immediate
	SXI[3]	610		2	Store XR immediate
	ADI[3]	620		2	ADD immediate
	SUI[3]	640		2	SUB immediate

NOTE:

[1] Cycle time: DMI 612 as low as; 100usec, typical 500usec
   DMI 610 and 611; 3msec

[2] Standard with DMI 611 and 612 only

[3] Standard with DMI 612 only

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*Check this easy comparison chart
for the DMI computer best suited
for your requirements...*

SPECIFICATIONS COMMON TO DMI SERIES 610, 611 AND 612 COMPUTERS

Organization............Binary, serial, single address

Data Word..............12-bit, sign and magnitude representation

Arithmetic..............Serial, Modulo 2^{11}

Index Register (611, 612)....1 Hardwired 12-bit register

Input/Output.............Model 33 Teletype Desk Top Unit with Keyboard - Printer, Perforated Tape Reader, and Punch. Included as standard equipment are: High speed read (24 char/sec) and low speed read (10 char/sec). All transmission is serial-parallel in and out of the accumulator. Provisions are made for other input-output devices.

Manual Control...........Manual data entry and binary display of all operational registers and overflow. Switches include: Sense Switches; Jump and Halt, Power "on" Switch, Operate Switches; "Run" and "Step."

Installation..............Requires no air - conditioning, wiring, subflooring or other special installation preparation. Regulated power supplies are included.

Dimensions..............60" x 30" x 31"

Weight..................250 lbs.

Operating Temp. Range......—10° C to 55° C

Humidity................To 90%

SPECIFICATIONS COMMON TO INDIVIDUAL MODELS

The **DMI 610** is a stored program, general purpose digital computer with a flexible instruction repertoire. Especially designed for education and research. Compact desk design, constructed from solid-state components and suitable for office environment. **DMI 610** individual specifications including ones mentioned above are: **Memory** . . . 256 words, all words directly addressable, magneto-strictive delay line, 3 msec. cycle time; **Flexible Instructions** . . . Arithmetic, Logical, Load, Store, Input, Output, Shifting and Control; **Software** . . . Maintenance and Utility Programs; **Power** . . . 80 watts, single phase 115 ± 10 volts, 60 cps.

The **DMI 611** is a stored program, general purpose digital computer with a flexible instruction repertoire and expandable memory. Designed for educational, research, and small systems applications. Compact desk design, constructed from solid state components and suitable for office environment. **DMI 611** individual specifications including ones mentioned above are: **Instruction Word** . . . 38 different instructions. Both 12 and 24 bit instruction; **Memory** . . . 256 words, expandable to 4096, magneto-strictive delay line, 3 msec. cycle time; **Flexible Instructions** . . . Fixed point Arithmetic, Logical, Load, Store, Input, Output, Shifting, Control, Indexing, Micro-Instruction and Macro-Instructions; **Software** . . . Maintenance Programs, Utility Programs, Double-precision arithmetic; **Power** . . . 100 watts, single phase 115 ± 10 volts, 60 cps.

The **DMI 612** is a stored program, general purpose digital computer with a flexible Instruction repertoire and expandable memory. Designed for research work, computation, and small system application. Compact desk design or rack mounting is available. Constructed from solid state components and suitable for office environment. **DMI 612** individual specifications including ones mentioned above are: **Instruction Word** . . . 50 different instructions, both 12 and 24-bit instructions; **Memory** . . . 256 words, expandable to 4096, magneto-strictive delay line, 100 usec. minimum access. (Typical 500 usec. access); **Indirect Addressing** . . . Single level indirect addressing under program control; **Flexible Instruction** . . . Fixed point arithmetic, Logical, Load, Store, Input, Output, Shifting, Control, Indexing, Indirect Addressing, Immediate type instruction, Micro-instructions, Macro-instruction capability; **Software** . . . Maintenance Programs, Utility Programs, Symbolic Assembler, Elementary Function Routines and FORTRAN; **Power** . . . 100 watts, single phase 115 ± 10 volts, 60 cps. 1½ watts additional for each 256 word memory module; **Rack Mounting** . . . Option available.

DMI DATA MACHINES, INCORPORATED

1590 MONROVIA AVE. • NEWPORT BEACH, CALIFORNIA 92660 • Telephone (714) 548-1159/646-9371

DATA MACHINES, INC. proudly announces the DMI 610 Series of Stored Program Scientific Computers. These computers set a new standard of performance and quality at half the cost of comparable equipment.

The enclosed brochure describes the DMI 610, 611 and 612 computers. I'm sure you'll agree that they are ideal for training, scientific computation and integration into systems. Astonishingly enough, you can have a DMI 610 computer in its handsome console with a decorator-matched chair, complete with input/output typewriter, paper tape punch and reader and comprehensive software for only $11,250.

Call or write me today for complete specifications and prices. Better yet, let's talk about your applications.

Cordially yours,

DATA MACHINES, INC.

A. M. Bradley

A. M. Bradley
Manager, Computer Applications

AMB:am

Enclosure: DMI 610 Brochure